

tacles for blood are no longer seen at an operating table, where the surgeon is willing to avail himself of the benefits to be derived from vivisection. It was by such experiments the Esmarch bandage, a bandage applied to a limb about to be amputated to prevent the flow of blood, came into use. This inaugurated bloodless surgery. The principles of antiseptics were studied on animals, and with the introduction of aseptic methods all dread of pyæmia, fever, tetanus, and secondary hemorrhage have disappeared. Inflammation is no longer a formula "redness swelling heat and pain," since by the experiments of Bernard, Virchow, and Cohnheim, and later by Redfern and Von Recklinghausen, on the blood cells in the leg of a frog and the eye of a rabbit, its secret has been pierced, and following it, new knowledge of abscesses, ulceration, gangrene, and clots.

The present abdominal surgery had its origin in vivisection. In the American Civil War out of 3,717 cases of wounded intestines 3,273 ended fatally. A series of experiments was conducted in Chicago, in which 37 dogs were etherized and shot, when the feasibility of opening the abdomen was proved. The percentage of fatal cases after such injuries at present is 12; before this experiment it was 88; that is, the position is exactly reversed, and if these experiments in vivisection had been performed before the Civil War, 3,273 soldiers, instead of 446, would now be living, and their injuries would not even be considered grave. Sir Spencer Wells, by operating on dogs, introduced the practice of suturing the peritoneum, and reduced the percentage of fatal cases from 34 to 11. Out of 1,000 cases of his, 760 were saved and 17,800 years added to the sum of human life. Martin, of Berlin, in the same manner, proved the possibility of ovariectomy, and performed this operation, which a few years ago used to be denounced as murderous, in 130 cases, with only one fatal result. By these observations on the opening and suturing of the peritoneum of animals, and the treatment of the pedicle by ligature, abdominal surgery is now a matter of routine.

Another feature in modern surgery is the progress made in operations on the brain, and all of these are based on experience gained by vivisection. Hitherto the brain was looked upon as "the oracle of God," but Dr. Ferrier, by his experiments on animals, demonstrated the location of sensory and motor functions in the cerebral hemispheres as clearly as if the skull and membranes surrounding the brain were transparent.

Dr. MacEwan, of Glasgow, in one year saved the life of ninety patients by following Ferriers methods. In one year Dr. Echeverria collected 165 cases of epilepsy, of which 75 were cured by